Mycorrhizae of Wading River region, L. I.

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In the summer of 1931 and 1932 the writer collected rootlets of thirty-six different trees and shrubs from Wading River region, Long Island. These collections were made in the vicinity of Deep Pond located in a pine-barren community whose predominant soil type is Sassafras loam with a narrow projecting arm of Sassafras sandy loam on the northwest side. The soil of the area immediately bordering the lake, however, where the rootlets were collected belongs to the Babylon sand which consists of a brownish-yellow sand to a depth of three feet. There is no differentiation into layers, other than a slightly darker colored surface due to incorporation of some organic matter.[1] The Babylon sand as well as most of the other soils of the area, showed a decided acid reaction according to a statement received from Loundsbury. Although this soil is unimportant agriculturally, one finds oaks, hickories, pitch pines, a few birch and ericaceous shrubs flourishing.

These rootlets were preserved in 5% formaldehyde until there was an opportunity to prepare microscopic slides from them. Mycorrhizae were found in all thirty-six collections with the ectotrophic type predominating.

Mycorrhizal Hosts and Types

The following list of trees and shrubs was investigated and found to be mycorrhizal hosts either for the ectotrophic or endotrophic type of infection. So far as the writer knows, the species indicated by an asterisk are new additions to the list of mycorrhizal hosts.

Ectotrophic: (Ectendotrophic type included)

Conifers

Juniperus virginiana L.
Pinus resinosa Ait.
Pinus rigida Mill.
Pinus Strobus L.
Pinus virginiana Mill.

[1] Loundsbury, Clarence, and others. Soil Survey of Suffolk and Nassau Counties, New York. Bureau of Chemistry and Soils, (U. S.) 1928, No. 28.

Deciduous Trees and Shrubs

**Betula populifolia* Marsh.
Carya laciniosa (Michx. f.) Loud.
Carya ovata (Mill.) K. Koch
Castanea dentata (Marsh.) Borkh.
**Cephalanthus occidentalis* L.
Platanus occidentalis L.
Populus grandidentata Michx.
Prunus serotina Ehrh.
Quercus alba L.
Quercus coccinea Muench.
**Quercus ilicifolia* Wang.
**Quercus prinoides* Willd.
Quercus stellata Wang.
Quercus velutina Lam.
**Rhus copallina* L.
Rhus glabra L.
Robinia Pseudo-acacia L.
**Salix cordata* Muhl.
**Salix pentandra* L.
Sassfras variifolium (Salisb.) Ktze.

Ericaceous Shrubs

**Gaylussacia baccata* (Wang.) C. Koch
Kalmia latifolia L.
**Leucothoe racemosa* (L.) Gray
**Lyonia mariana* (L.) D. Don

Endotrophic:

Deciduous Trees and Shrubs

Acer rubrum L.
**Aronia arbutifolia* (L.) L.f.
**Amelanchier canadensis* (L.) Medic.

Ericaceous Shrubs

Myrica carolinensis Mill.
**Clethra alnifolia* L.
**Vaccinium stamineum* L.
Vaccinium vacillans Kalm.

The endotrophic type of mycorrhizae was found upon the rootlets of seven species in the collection. Externally these showed bead-like swellings and swollen tips and internally intracellular granular masses, hyphae, fragments of hyphae and spore-like bodies.

The remaining twenty-nine species harbored the ectotrophic type. The conifers were characterized by the dichotomously branched short roots and coralloid clusters, and the deciduous trees and shrubs by coralloid clusters and unbranched short

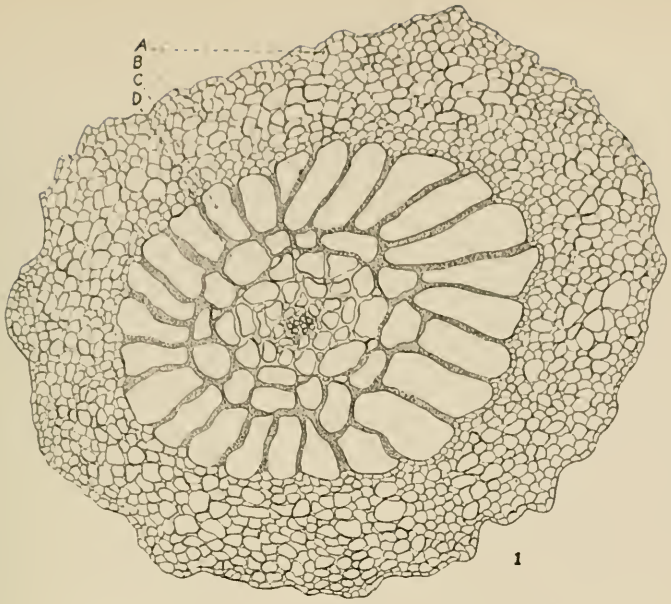

Fig. 1. Cross-section of ectotrophic mycorrhiza from *Quercus ilicifolia* showing fungal mantle of pseudoparenchyma tissue (A); intercellular net (B) producing radial elongation of cortical cells (C); hypertrophy of cortical cells (D); ×200.

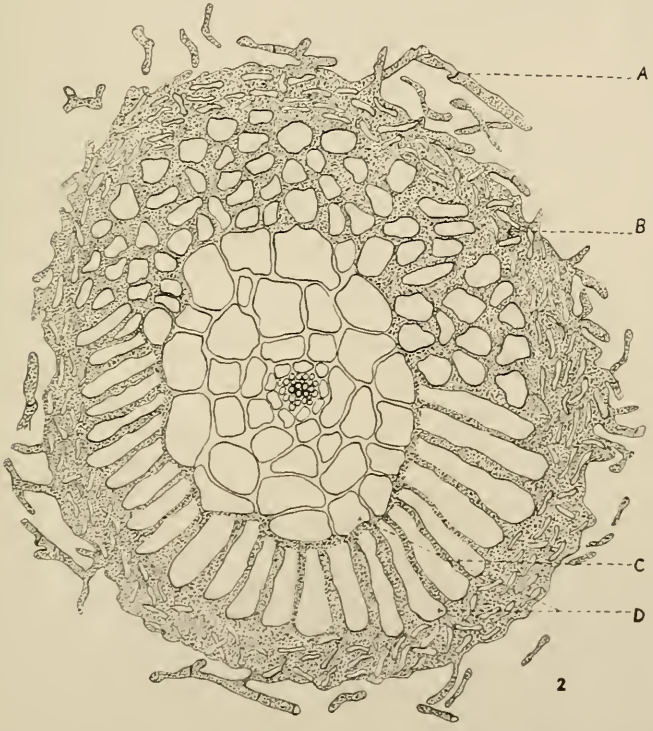

Fig. 2. Cross-section of ectotrophic mycorrhiza from *Lyonia mariana* showing clamp connections (A) on hyphae projecting from the prosenchymatous fungal mantle (B); intercellular net (C); hypertrophy of cortical cells (D); ×200.

Data for New Host Plants

New Host Plants	Date of Collection	External Form of Infected Rootlet	Internal Structure
Ectotrophic:			
Betula populifolia	Aug. 31	Coralloid	Prosenchyma fungal mantle, intercellular net, cortical cell hypertrophy.
Cephalanthus occidentalis	Aug. 32	Coralloid	Thin prosenchyma fungal mantle, intercellular net occupies two-thirds of cortex, cortical cell hypertrophy.
Quercus ilicifolia	Aug. 31	Coralloid	Pseudoparenchyma fungal mantle, intercellular net with radially elongate cells on one side only, hypertrophy.
Quercus prinoides	Aug. 31	Coralloid	Prosenchyma fungal mantle, intercellular net, hypertrophy.
Rhus copallina	Aug. 32	Swollen short-roots	Prosenchyma fungal mantle, intercellular net, one row of radially elongate cortical cells, hypertrophy.
Salix cordata	Aug. 32	Coralloid, short-roots	Prosenchyma fungal mantle, intercellular net, hypertrophy.
Salix pentandra	Aug. 32	Coralloid	Pseudoparenchyma and prosenchyma fungal mantle, intercellular net, hypertrophy.
Gaylussacia baccata	Aug. 32	Short-roots, dichotomously branched tips of lateral roots	Thin prosenchyma fungal mantle, intercellular net, hypertrophy.
Leucothoe racemosa	Aug. 32	Coralloid	Prosenchyma fungal mantle, intercellular net, hypertrophy, cortical cells contain red granules.
Lyonia mariana	Aug. 32	Swollen short-roots, swollen tips	Prosenchyma fungal mantle, intercellular net, radially elongate cortical cells on one side, hypertrophy. Clamp connections on hyphae projecting from mantle.
Endotrophic:			
Aronia arbutifolia	Aug. 32	Swollen tips, short-roots	Intracellular granular masses, spore-like bodies.
Amelanchier canadensis	Aug. 32	Bead-like swellings and swollen short-roots	Intracellular granular masses, spore-like bodies.
Clethra alnifolia	Aug. 32	Short-roots with root hairs	Intracellular hyphae and fragments of hyphae.
Vaccinium stamineum	Aug. 32	Bead-like swellings and swollen short-roots and tips	Intracellular hyphae and fragments of hyphae.

roots. The internal structure showed the usual features, such as pseudoparenchyma or prosenchyma fungus mantles, intercellular net (Hartig's net) between the cortical cells, and hypertrophy of cells of cortical region (Fig. 1).

The hyphae projecting from the fungal mantles of two of the ericaceous shrubs namely, *Lyonia mariana* (Fig. 2) and *Kalmia latifolia*, showed clamp connections very clearly. This is, at least, an indication that these mycorrhizae are produced by association with basidiomycetes.

Quercus coccinea, *Quercus prinoides*, *Salix pentandra*, and *Sassafras variifolium* possessed, in addition to the normal coralloid form, some tuberculate mycorrhizae. These are characterized by the presence of a fungal mantle common to several mycorrhizae. In nearly all cases the mycorrhizae were well developed, a fact which may be attributed to the decidedly acid reaction of the loose quartz sandy soil.

Summary

Mycorrhizae, 29 of which were ectotrophic and 7 endotrophic have been found on 36 different trees and shrubs from Wading River region, L. I. Among these 14 are new additions to the list of mycorrhizal host plants.

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